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WEED ABSTRACTS

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NOTES FOR READERS

Weed Abstracts endeavours to provide a comprehensive coverage of the world's literature on weeds, weed control and closely allied subjects. To this end, over 370 journals and nearly 100 annual reports are regularly searched. Other journals, reports, bulletins, etc. are abstracted as they are seen. Additional coverage is obtained through agreements with other abstracting organizations.

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As far as possible the journal abbreviations used are those given in the World List of Scientific Periodicals. Holding library symbols are also taken from the World List, e.g. O.BO = Botany Department, Oxford. Numbers at the end of abstracts, e.g. 75(492) are for internal use only.

When a paper is by more than one author, the address of the first author only is given.

Where an abstract is taken from an abstracting journal the acknowledgement follows the abstract, e.g. Herb.Abstr. 2:163. Where it is quoted only in part the acknowledgement is preceded by the word "from", e.g. From Biol.Abstr. 2:294.

The Information Section is always pleased to receive comments and suggestions for the improvement of Weed Abstracts.

* An asterisk before the author's name indicates that only the title of the paper has been seen.

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ac	- acre(s)	in.	- inch(es)	p.s.i.	- pounds per square in.
a.e.	- acid equivalent	kg	- kilogram(s)	v/v	- volume/volume
a.i.	- active ingredient	l	- litre(s)	w/v	- weight/volume
cm	- centimetre(s)	lb	- pound(s)	w/w	- weight/weight
d.b.h.	- diameter at breast height	m	- metre(s)	>	- greater than
		ml	- millilitre(s)	<	- less than
ft	- foot(feet)	oz	- ounce(s)	#	- pounds per acre
g	- gram(s)	post-em.	- post-emergence	*	- with or without
gal	- gallon(s)	pre-em.	- pre-emergence		
ha	- hectare(s)	p.p.m.	- parts per million		

Language abbreviations: an initial capital denotes the language of the article, a small letter that of the summary: - Dan. - Danish, Du. - Dutch, E. - English, F. - French, G. - German, It. - Italian, Jap. - Japanese, Nor. - Norwegian, Russ. - Russian, Span. - Spanish, Sw. - Swedish.

1518. ERDMANN, M.H., MEGGITT, W.F., CHURCHILL, B.R. and GRIGSBY, B.H. (Michigan State Univ., East Lansing, U.S.A.). Weed control in field crops. Ext. Folder, Cooperative Ext. Serv., Michigan State Univ., 3rd Revision, 1961, pp.6, tabs.1.

Outlines very briefly methods of cultural and chemical weed control, including the principles of chemical control, and recommendations for the calibration and cleaning of sprayers and rates of application. A table is given of herbicides suitable for use with field and herbage crops and also Mentha sp. with rates and time of application, types of weeds controlled and general remarks. - M.G.G. [88(77.4)]

1519. CANADA, DEPARTMENT OF AGRICULTURE. Field husbandry. Weed control research. Rep. Minist. Agric. Canada 1958-9, 1959, 95-6, 99.

EPTC 4 # a.i. gave >90% control of wild oats [Avena fatua] and green foxtail [Setaria viridis] without injuring sugar-beet in tests at Lethbridge, Alberta. At Indian Head, 2,3,6-TBA 20 # gave excellent control of Russian Knapweed [Centaurea repens]. A method was developed to induce a dormancy very similar to the natural type in wild-oat seeds. It consisted essentially of a prolonged soaking followed by drying. In the Swift Current area, Saskatchewan, yields and quality of crops were reduced when herbicides replaced all tillage operations on fallow. At Indian Head, wheat on a chemically treated fallow yielded 13.7 bushels/ac, while on a standard fallow the yield was 25.4 bushels/ac. In extensive tests throughout the Prairie Provinces in 1957-8, the protein content of wheat grown on fallow was usually higher than that of wheat grown on stubble. Addition of N fertilizer generally increased protein content, but added P fertilizer sometimes had an opposite effect. Use of 2,4-D did not adversely affect protein content of wheat.

In tests at Lethbridge, use of a mould-board plough, a one-way disc and a sub-surface cultivator conserved moisture and controlled weeds, but the most wind-resistant soil surface was produced by use of the sub-surface cultivator. Spray drift of butyl ester, low-volatile ester and amine formulations of 2,4-D on growing sunflowers resulted in distortion of leaves and stems. Effects were clearly discernible at 120 rods distance. As a result of 1 hour of spraying, with a wind velocity of 9 miles/hour, seed yield was reduced by 42, 38 and 37% for ester, low-volatile ester and amine formulations, respectively. From Field Crop Abstr. 14:1445. - J.W.F.

1520. MORIYA, T. and DAIBO, H. [Studies on the cultivation method by drill. 2. Weed control on the oat cultivation method by drill.] Bull. Tohoku Natl. Agr. Expt. Sta., 1960, 18, 84-9. (Jap.e.).

Weeds affected yields most during and after the period of internode elongation. Spraying oats in the seedling stage and at the beginning of tillering caused leaf injury; the safest spraying time was after completion of tillering. From Biol. Abstr. Sect. D, 36:38708. - J.W.F.

1521. PETERSEN, H.I. Kemisk Ukrudtsbekaempelse - en god økonomisk foranstaltning. [Chemical weed control - a good economic measure.] Tolvmandsblad, 1960, (4), 159-62, figs.2.

Practical recommendations are given for the herbicidal control of weeds in grass seed crops, winter and spring cereals, newly established pastures, fibre flax, peas and beet. A brief note is given on mixtures of herbicides and insecticides. Parathion, malathion and DDT are stated to increase the herbicidal effect of growth-regulator herbicides and the scorch effect of dinoseb and DNOC, especially in the case of peas and fibre flax. Applications of malathion 2 days after the application of a growth-regulator herbicide has caused crop damage, and it is recommended that at least 1 week should elapse between applying these types of herbicides and insecticides. - P.J.B. [107(489)]

1522. HOWDEN, J.S. et al. Weeds committee report. Rep. Annu. Conf. Manitoba Agronomists, 1959, 35-40.

Results of an experiment carried out in 1953-7 on the effect of cultural practices on wild-oat control are reported. Barley sown on 8 June had a much lower wild-oat population than that sown on 8 May, but the late-sown plots yielded significantly less than the early-sown. Seed rate had little influence on wild-oat incidence in the first year, but thereafter plots sown with 2.5 bushels/ac, had fewer wild oats than those sown with 1.25 bushels/ac. There was little evidence of an effect of fertilizer on wild-oat control. After the first year, post-sowing rod weeding was extremely effective provided weather and soil were favourable. In tests of various chemicals for weed control in field shelter belts in 1958-9, simazine at 6 and 9 # gave fair weed control in the first season and complete weed control in the second, without apparent tree damage. Dalapon at 20

or 40 # + 2,4-D at 1 # gave 100% weed control in the first year after application, but no control in the second year, and severely affected all tree species concerned. Atrazine at 8 # gave good weed control in the first year with no tree damage. The effects of TCA and dalapon on the morphology, yield and seed quality of Redwood, Raja and Marine flax were investigated. In general, TCA at the recommended rate had no effect on yield, but excessive dosages caused slight injury to the flax. It had no effect on oil content, oil quality or seed viability. Dalapon reduced yield slightly even at the recommended rate of 1 #, but did not affect oil content, quality or seed viability. Dalapon at 3 # produced serious reductions in yield and oil quality. Suggested rates of di-allate and barban for trial use in wild-oat control in wheat, barley, flax, sugar-beet, rapeseed, sunflower and peas are listed. From Field Crop Abstr.14:1444. J.W.F.

1523. ROBINSON, E.L. (N.Carolina Agric. Exp.Sta.,Whiteville,U.S.A.). Soil-incorporated pre-planting herbicides for witch-weed control. Weeds, 1961, 9,(3),411-15, tabs.3,bibl.7.

In a pre-sowing screening trial in 1958, 2,4-D (alkanolamine) 3-12 # and 2,3,6-TBA (sodium) 3-12 # were effective in controlling Striga asiatica, as measured by maize yields, whereas the following were not: simazine 4-12 #, EPTC 4-16 #, monuron 1-4 #, diuron 1-4 #, CDAA 4-16 #, CDEC 4-16 #, and chlorpropham 4-16 #. In 1959, the most promising of pre-sowing treatments was fenac (sodium), which at 4 # resulted in the highest maize yield with little or no effect on maize stand; 8 and 12 # gave excellent control of Striga, but significantly reduced maize stands. 2,4-D (alkanolamine) 4-12 # and 2,3-6 TBA (sodium) again gave excellent Striga control with little or no maize stand reduction and so, also, did the monoethanolamine salts of 2-methoxy-3,5,6-trichloro- and 2-methoxy-3,6-dichloro-benzoic acids. There were no significant differences in maize yields between sowings made 5, 10 and 20 days after application.

Severe injury was caused to soybeans and tobacco sown in the following year by the residual effect of fenac at all rates and to groundnuts and cotton at 12 #; the residual effect of 2,3,6-TBA caused severe injury to tobacco at 8 and 12 # and at 12 # moderate injury to groundnuts, cotton and soybeans. D.M.L.S. [55(75.6)]

1524. MAKODZEBA, I.A. Bor'ba s sorniakami na posevakh kukuruzy. [Weed control in maize fields.] Kukuruza, 1960, (4), 45-48.

Results of a number of experiments are reported on the use of various methods of treating soil, handling plants, and the use of salts and esters of 2,4-D, MCPA and other herbicides for weed control in maize. The best results were obtained by the combined use of herbicides with inter-row tillage. From Biol.Abstr.Sect.D, 36:46182. J.W.F.

1525. CHESALIN, G.A. Chemical control of weeds. Kukuruza 1960, (4),48-50.

An account is given of results of several experiments carried out in various soil-climatic regions of the USSR, on the use of 2,4-D, DNOC, PCP and MCPA and other herbicides on the control of weeds in maize. Good results were obtained with simazine and atrazine. Experiments carried out in the Moscow and Briansk regions showed that simazine 1-1.5 kg/ha a.i. probably killed annual monocotyledonous and dicotyledonous weeds during the entire vegetative period; it was most effective when sprayed pre-sowing to the soil in 400-500 l water before seedbed cultivation, or immediately after sowing. Potatoes and peas, sown on areas where simazine had been applied in the spring of the previous year did not show any toxic after-effects, but spring wheat, flax, garden beets and carrots were killed under these conditions. From Biol.Abstr.Sect.D, 36:46173. - J.W.F.

1526. FRATKIN, A.B. Nouye gerbitsidy-simazin i atrazin - dlia shirokhikh ispytanii v posevakh kukuruzy. [New herbicides - simazine and atrazine - for widespread testing in maize fields.] Kukuruza 1960, (4),51.

For control of weeds in maize, the All-Union Institute for Plant Protection and the All-Union Fertilizer and Soil Science Institute recommend the use of simazine and atrazine in non-chernozem areas on light soils at 1.25 kg/ha and on clayey soils at 2 kg/ha, in chernozem zones with sugficient moisture at 2 kg/ha and in dry regions, 3 kg/ha. It is recommended that these herbicides should be applied in 400-600 l spray/ha before or immediately after sowing maize. From Biol.Abstr.Sect.D, 36:46174. - J.W.F.

1527. BAIKO, V.P. and BADKOVA, E.N. Primenenie gerbitsidov na posevakh prosa. [The use of herbicides on plantings of millet.] Zemledelie, 1960, 5,58-60.

In a 3-year experiment, 2,4-D, MCPA and 2,4-D butyl ester at 0.35-1.0 kg/ha, were applied to weed-infested millet. Pre-em. applications were ineffective, the best results being obtained when 0.7-1.0 kg/ha was applied when the millet was in the tillering state. From Biol.Abstr.Sect.D, 36:46171. - J.W.F.

1528. GOARIN, P. (Sta.Agron.,Lac Alaotra, Madagascar). La lutte contre les mauvaises herbes dans la culture du riz a Madagascar. [Weed control in rice crops in Madagascar.] Mem.Inst.sci.Madagascar, 1959, 9,35-40, bibl.2.

In Madagascar, the principal weeds of rice are: Ischaemum rugosum (the most noxious), Leersia hexandra, Echinochloa colonum, E. stagnina, Panicum pyramidale, Pycreus tremulus, Courtoisia cyperoides and Eleocharis plantaginea. In trials of chemical weed control, 2,4-D, applied by aircraft, controlled most weeds, with the exception of the Gramineae, and did not damage the rice plants. Against the Gramineae, cultural methods only are of any avail. From Field Crop Abstr.14:1164. - J.W.F.

1529. COLUMBIA SOUTHERN CHEMICALS. (Columbia Southern Chemicals, One Gateway Center, Pittsburgh 22,Pennsylvania,U.S.A.). 75% Wettable IPC for effective control of both wild oats and volunteer grains provides increased yields of sugar beets. Product Bull.,Columbia Southern Chemicals., [n.d.], pp.2, figs.1.

Propham as a 75% wettable powder, applied overall pre-sowing at 3-4 # a.i. in 10-20 gal/ac, at pressures below 50 p.s.i. to avoid drift is recommended for the control of wild oats [Avena fatua] and volunteer cereals in sugar beet. The herbicide is incorporated to a depth of 4 in. immediately by cross-discing and the crop is sown within 2 days. - M.G.G. [O.W.]

1530. MARX, G.A. and HAGEDORN, D.J. (Wisconsin Agric.Exp.Sta.,Madison,U.S.A.). Plant population and weed growth relations in canning peas. Weeds, 1961, 9,(3),494-6, tabs.3.

In a 3-year trial in which 2 pea varieties were sown at 1.44, 2.125 and 3.44 in. apart in rows 7 in. apart, the higher sowing rates consistently reduced weed development expressed as a percentage of the total fresh weight of peas + weeds. - D.M.L.S. [O.W.]

1531. COLUMBIA SOUTHERN CHEMICALS. (Columbia Southern Chemicals, One Gateway Center,Pittsburgh 22, Pennsylvania,U.S.A.). 75% Wettable IPC provides an effective weed control method for pea and lentil fields that are badly infested with wild oats. Product Bull.,Columbia Southern Chemicals, [n.d.],pp.2, figs.2.

Propham, as a 75% wettable powder, applied pre-sowing at 4 # a.i., overall in 10-20 gal/ac, at pressures below 50 p.s.i. to avoid drift, gives control of wild oats [Avena fatua] in lentils, wrinkled and smooth peas (but not autumn-sown Austrian peas), in the year of treatment, and in wheat the following year. The herbicide is incorporated to a depth of 4 in. immediately after application by cross-discing and the crop is sown within 2 days. - M.G.G. [O.W.]

1532. KROMWIJK, P.A.M. (Chemische onkruidbestrijdingsproeven in vezelvlas in 1957 en 1958. [Chemical weed control trials in fibre flax in 1957 and 1958.] Meded.Proefst. Akker.-Weidebouw,Wageningen, 1960, (41),pp.62, (Du.f.).

The results are given of interprovincial trials in the Netherlands and of international trials in the Netherlands, Belgium and France in 1957 and 1958, in which dinoseb, DNOC-sodium, MCPA, MCPB, dinoseb + MCPA and DNOC + MCPA were applied to flax post-em. The results of interprovincial trials in 1957 indicated that, with the exception of DNOC and to a lesser extent, DNOC + MCPA, the more effective the control of weeds, the greater the crop damage. Injury or growth inhibition was accompanied by a fall in lint content and fibre quality and a reduction in total fibre yield. In general, DNOC-sodium gave the best results and least crop damage and was not so critical as to dosage rate as the other herbicides. DNOC gave excellent control of Polygonum convolvulus and satisfactory control of Stellaria media, Sinapis arvensis, Thlaspi arvense and Capsella bursa-pastoris. MCPA controlled most weeds except Polygonum convolvulus satisfactorily, while MCPA + dinoseb and MCPA + DNOC controlled a wider range of weeds than DNOC alone. MCPA + dinoseb resulted in considerable crop scorch and the MCPA + DNOC mixture was less effective than DNOC alone.

In the international trials, DNOC again gave the best results, or was among the best treatments. MCPA gave satisfactory weed control in many cases, but caused growth inhibition, which was later reflected in fibre quality and yield at harvest.

In interprovincial trials in 1958, herbicides were applied to flax undersown with red clover, white clover, lucerne and hop clover [Trifolium procumbens]. In 1 trial, red

clover and lucerne tolerated all herbicides and mixtures well. Hop clover showed sensitivity to MCPA + DNOC mixture. In a second trial, DNOC and MCPA + DNOC caused injury to the undersown species, especially hop clover. Red clover showed the greatest tolerance. Of the most prominent weeds present, only Atriplex sp., Matricaria sp. and Polygonum aviculare were not completely controlled by DNOC or MCPA + DNOC. In trials in Belgium (Gent), MCPA-sodium (300 g/ha in 100 l water) caused some injury to red clover undersown in flax and considerable injury to hop clover and lucerne. In contrast to the results of trials in the Netherlands, dinoseb-ammonium (720 g/ha) and DNOC-sodium (2 kg/ha) were very safe on lucerne and red clover and also on hop clovers provided rates higher than these were not used and MCPA was not added. MCPB-sodium (400 g/ha) was safe on all three legumes. MCPB was less injurious to flax than MCPA and dinoseb and DNOC caused little injury. Dinoseb gave the best and DNOC the poorest weed control. MCPB + MCPA mixed in a ratio of 15.1, with MCPB applied at 400 g/ha gave better weed control than MCPA alone at 400 g. DNOC gave poor control of Chenopodium album. Mecoprop did not appear to be suited for use in flax owing to its effect in inhibiting stem growth. Where the same total dosage was used with mixtures of MCPA and MCPB, increasing the proportion of MCPB to MCPA from 1:3 to 1:15 increased flax fibre yields but reduced weed control. The alkanolamine salt of dinoseb was less injurious to flax than dinoseb-ammonium, and also slightly less effective against weeds. The alkanolamine salt was considered to have potential for use under conditions in which herbicidal injury to flax was likely. TCA, even at very low dosage rates, was injurious to flax.

The results of trials to determine optimum spray volumes were inconclusive. - P.J.B. [218(492)]

1533. NETHERLANDS, STICHTING VOOR DE NEDERLANDSE VLASTEELT EN VLASBEWERKING TE WAGENINGEN. [Weed control.] Jaarversl. Sticht.Ned.Vlasteelt en Vlasbewerk.,Wageningen 1959, 1960, pp.42.

pp.23-5, 32. In trials in 1959, mixtures of herbicides (post-em.) gave the best control of weeds in flax and of the mixtures used [not specified], DNOC-sodium + MCPA caused least crop injury. DNOC-sodium, alone, gave good results, especially against Polygonum convolvulus. Though this herbicide in some cases caused scorch in the crop, it did not have any effect on eventual fibre yields, as did the growth-regulator herbicides. Stellaria media, Galium aparine, Matricaria sp., Polygonum persicaria, Polygonum aviculare and Veronica hederifolia were difficult to control. DNOC was less effective than growth-regulator herbicides against Chenopodium album, Sonchus sp., Equisetum arvense and Cirsium arvense. In a trial in which mecoprop at 2, 4 or 6 l/ha [a.i. not given] in 800 l spray and at 4 l in 1600 l spray was applied. The 4 and 6 l rates caused deformities and growth inhibition, while the 2 l rate caused no apparent injury. The 2 l rate appeared insufficient to control Galium aparine and Stellaria media.

In trials on flax undersown with legumes, DNOC-sodium [rate not given] applied post-em. to red clover and lucerne caused leaf scorch initially, but had no apparent effect as determined after flax harvest, but with hop clover [Trifolium procumbens], MCPA + DNOC-sodium and DNOC-sodium alone, reduced stands. - P.J.B. [219(492)]

1534. NETHERLANDS, STICHTING VOOR DE NEDERLANDSE VLASTEELT EN VLASBEWERKING TE WAGENINGEN. [Weed control.] Jaarversl. Sticht.Ned.Vlasteelt en Vlasbewerk, Wageningen 1960, 1961, pp.37.

pp.23-5. In trials to determine the effect on flax of different hebicides and spray volumes (200, 500 and 800 l/ha), crops 4-6 cm tall were treated with DNOC-sodium, DNOC + MCPA, mecoprop, MCPA and dinoseb + MCPA. Except for DNOC alone, all herbicides inhibited flax growth and reduced fibre and lint yields. DNOC controlled Polygonum convolvulus and Sinapis arvensis well, but not the other weeds present. MCPA and DNOC + MCPA controlled a wider range of weeds than DNOC alone, but caused more crop injury, while mecoprop and dinoseb + MCPA resulted in still greater crop damage. Spray volume did not appear to affect results in the case of MCPA and DNOC + MCPA, but increasing the concentration of mecoprop from 1.5 l to 3.5 l of commercial product in 800 l spray reduced straw and lint yields and fibre quality. P.J.B. [221(492)]

1535. MARTIN, A.G. and WIESE, A.F. (Texas Agric.Exp.Sta.,Bushland,U.S.A.). Drift and toxicity problems associated with using chlorinated benzoic acids. Proc.14th Southern Weed Conf. 1961, 1961, 60.

The dimethylamine salts of polychlorobenzoic acid (PBA) (30% trichloro-) and trichlorobenzoic acid (TBA) were less toxic to cotton than emulsifiable 2,4-D acid, 2,4-D propylene glycol butyl ether (PGBE) ester, fenoprop PGBE ester, or 2,4,5-T

butoxyethanol ester. PBA and TBA at 1 # and 2,4-D 0.1 # applied to cotton at the 2- to 4-leaf stage reduced yields by about 50%. TBA was more toxic to soybeans than 2,4-D, 2,4,5-T or fenoprop; a rate of 1 # applied to soybeans 6-8 in. tall killed the plants. In trials in Texas, TBA and PBA 20 and 40 # applied to the soil caused no damage to cotton by volatilization, but caused considerable injury to soybeans. PBA 40 # applied in 80 gal water at 20 p.s.i. in a 10 miles/hour wind damaged cotton up to 5 ft down-wind from the treated area; increasing the spray pressure markedly increased damage from drift. - P.J.B. [O.W.]

1536. PORTER, W.K., THOMAS, C.H., SLOANE, L.W. and MELVILLE, D.R. (Louisiana State Univ., Baton Rouge, U.S.A.). A preliminary report on lay-by weed control in cotton. Proc. 14th Southern Weed Conf. 1961, 1961, 62.
In trials in 1959 and 1960, diuron 1 # in 20 gal water was applied to cotton at different growth stages after the plants had reached a height of 6 in. in 1959 and 18 in. in 1960. Control of annual weeds was excellent in both years, but cotton yields were not increased. Incorporation of the diuron into the soil reduced the degree of weed control obtained. In further trials in 1959 and 1960, lay-by applications of diuron 1 # were made to one-half of the plots 2 weeks before applying normal mechanical lay-by treatments to the other half. The halves of plots treated with diuron remained undisturbed until harvest, while the mechanically treated halves received one additional cultivation. At harvest, cotton from each half of the plots showed no differences in pre-harvest and harvest losses, yield, wagon trash, grade or staple. Plots not treated with diuron were heavily infested with grass. From these results, it was concluded that chemical lay-by treatments were of doubtful value. - P.J.B. [O.W.]

1537. SATYANARAYAN, Y. and RANADIVE, J.P. (Inst. Sci., Bombay, India). The weed flora of North Gujerat cotton fields. Indian Cotton Rev., 1960, 14, (2), 131-6, bibl. 12.
A table gives a list of 91 weed species, their local names, and flowering and fruiting periods. A brief account is given of the control, by cultivation methods, of the following weeds: Cyperus rotundus, Cynodon dactylon, Epaltes divaricata, Vocia indica, Eclipta alba and Striga densiflora. From Field Crop Abstr. 14:1357. - J.W.F.

1538. CROP PROTECTION COURIER. The defoliation of cotton with DEF. Problems and results in the United States. Seven million acres of defoliated and desiccated cotton. Crop Prot. Courier, Farbenfabriken Bayer AG, 1961, 4, (1), 52-3.
DEF = s,s,s,-tributylphosphorotrithioate.
[306(43)]

1539. MALLET, C. (Cent. Tech. Oleag. Metrop., Paris, France.) Le desherbage chimique du colza. [Chemical weeding of rape.] Oleagineux, 1961, 16, (4), 247-50, bibl. 11.
In trials in 1958-60, dalapon 2.5 kg/ha (commercial product) gave good control of grass weeds in rape when treated at the 3 to 4-leaf stage in the autumn. From Field Crop Abstr. 14:1401. - J.W.F.

1540. HENDRIX, N.J. (Rijkslandbouwconsulentschaap voor Zuid-Limburg, Roermond, Netherlands). Herfstbespuiting van onkruid. [Autumn treatment of weeds.] Landbouwvoorl., 1960, 17, (4), 182-3, figs. 1.
Treatment of Ranunculus spp. in pastures in spring with MCPA when a few flowers have opened, but most plants are in the flower-bud stage, has frequently given disappointing results, owing to differences in date of flowering between Ranunculus repens, R. acris and R. bulbosus. In 2 years' trials in S. Limburg, applications of MCPA 2 kg/ha during the period 20 September to 20-25 October gave good control of Ranunculus spp. Pastures should not be grazed for 8-10 days before treatment, or for 10 days after. Autumn treatments with this rate of MCPA have also given good control of Taraxacum officinale, Senecio jacobaea, Bellis perennis, Leontodon autumnalis and Cardamine pratensis. The use of MCPA at 2 kg/ha is not advised on light soils. P.J.B. [222(492)]

1541. JONES, L. Renovation of old pasture. Exp. Progr. 12, Rep. Grassl. Res. Inst., Hurley 1958-9, 1960, 24.
Part of a 4-year old ryegrass/white clover sward was sprayed on 22 April, 1959, with a mixture of dalapon (5 # a.e.) and amitrole (5 #). Some sprayed and unsprayed plots were ploughed a week later. Ploughed and unploughed plots were disced and harrowed in mid-May and sown with S22 Italian ryegrass on 22 May. Dry-matter yields/ac in August were: sprayed only, 370 lb, ploughed only, 840 lb; sprayed and ploughed, 1000 lb. Establishment of ryegrass was poor as the ground was very dry and hard. Herb. Abstr. 31:980.

1542. MITSUI, K. et al. Studies on the renovation in native grasslands. (2) Control methods of a few dominant vegetations and efficiency of surface reseeding. J.Kanto-Tosan Agric.Exp.Sta., 1960, (15),91-111, (Jap.e.), bibl.4.
For eradication or control of shrubs and other plants which hinder full utilization of grasslands, 2,4-D was less efficient than $NaClO_3$ and was too costly for the low level of utilization of these grasslands. $NaClO_3$ reduced shrub growth to one-third of the previous year's growth. On Sasa-type and Zoysia-type grasslands, good results were obtained by surface resowing 30 days after treatment with $NaClO_3$ (at 20 g/tsubo) [1 tsubo - 3.3 m^2] and in the Miscanthus-type grassland by resowing 21-28 days after treatment with $NaClO_3$ (at 40 g/tsubo). From Herb.Abstr.31:522. - J.W.F.

HORTICULTURAL, ORNAMENTAL AND PLANTATION CROPS

1543. VERLAAT, J.G. Chemische onkruidbestrijding in de vollegronds groenteteelt. [Chemical weed control in outdoor vegetable crops.] Meded.Proefst.voor de Groenteteelt in de Volle Grond,Alkmaar, 1961, 18, pp.80, (Du.e.g.), figs.21,bibl.8.
The principles of pre-sowing, and pre-planting, pre-em. and post-em. herbicidal treatments, herbicidal selectivity, the different types of herbicides currently available in the Netherlands for use in vegetable crops, the effect of weather conditions, soils, apparatus and techniques, sowing methods in relation to herbicidal use are reviewed. Recommendations are given for the use of herbicides in potatoes, strawberries, endive, asparagus, beans, peas, cabbage, red beet, parsley, leeks, rhubarb, scorzonera, celery, shallots, lettuce, spinach, onions, chicory and carrots, together with annotated illustrations of the principle weeds of vegetable crops in the Netherlands. - P.J.B. [232(492)]

1544. VERLAAT, J.G. (Proefst.voor de Groenteteelt in de Volle Grond,Alkmaar, Netherlands). Chemische onkruidbestrijding in de Nederlandse groenteteelt in volle grond. (1), (2). [Chemical weed control in outdoor vegetable crops in the Netherlands. (1), (2).] Tuinbouwberichten, 1959, 23,(11), 260-2 and (12),287-90.

1545. VERLAAT, J.G. (Proefst.voor de Groenteteelt in de Volle Grond, Alkmaar, Netherlands). Chemische onkruidbestrijding en zaaimethode. [Chemical weed control and sowing method.] Groenten en Fruit, 1959, 14,(43),1272, figs.6.
Sowing method (broadcast as opposed to row drilling) in relation to the use of contact and residual herbicides is discussed and it is shown that broadcast sowing is not compatible with chemical methods of controlling weeds, except on small plots on which it is possible to ensure that a sufficiently thick soil layer covers the seed. Crops normally sown broadcast in the Netherlands include leeks, spinach and brassicas. - P.J.B. [227(492)]

1546. VERLAAT, J.G. (Proefst.voor de Groenteteelt in de Volle Grond,Alkmaar, Netherlands). Chemische onkruidbestrijding in de herfst. [Chemical weed control in the autumn.] Groenten en Fruit, 1959, 15,(7), 195.
The following recommendations are given: 1. autumn spinach and lettuce, sulphuric acid 0.6-0.8 l/are in 8-10 l water or PCP in oil 0.3-0.4 l/are in 2-10 l water, pre-em. 2. endive, chlorpropham pre-planting; 3. carrots, PCP in oil ± chlorpropham pre-em., herbicidal oils 800-1000 l/ha post-em. when the plants have 2 true leaves, or PCP in oil + chlorpropham post-em. at the same growth stage; 4. rhubarb, simazine 1 kg/ha in 1000 l spray in September or October, or dalapon 10-20 kg/ha for the control of Agropyron repens in the dormant season. P.J.B. [230(492)]

1547. VERLAAT, J.G. (Proefst.voor de Groenteteelt in de Volle Grond,Alkmaar, Netherlands). Zwavelzuur als onkruidbestrijdingsmiddel. [Sulphuric acid as a weed killer.] Groenten en Fruit, 1959, 14,(39), 1133, figs.2.
Practical recommendations are given for the use of sulphuric acid pre-em. in red beet, leeks, lettuce, spinach, onions and chicory and post-em. in leeks and onions 4-6 cm tall. - P.J.B. [228(492)]

1548. VERLAAT, J.G. (Proefst.voor de Groenteteelt in de Volle Grond,Alkmaar, Netherlands). Chemische onkruidbestrijding op preizaaibedden. [Chemical weed control on leek seedbeds.] Tuinbouwberichten, 1960, 24,(3),59-61.
See Weed Abstr.9:1924. [223(492)]

1549. CREEL, J.M. and TYNAN, J.A. (Substa.No.19,Crystal City,Texas,U.S.A.). Chemical control of weeds in spinach and onions in the winter garden, 1959-60. Progr.Rep.Texas Agric.Exp.Sta., 1960, 2163. pp.4.

Zytron [O-(2,4-dichlorophenyl)-O-isopropyl-methylphosphoroamidothioate] 3 # and CDEC 3 # applied pre-em. gave excellent and good control, respectively, of Amaranthus sp. without injury to spinach. CDEC 6 # (but not 3 #), endothal 2 and 4 # and CDEC 3 + endothal 2 # caused severe injury. Good control without crop injury was obtained in an onion seedbed by pre-em. applications of Herbisan 5 [Bis(ethyl xanthic)disulphide 58%] 10 #, Zytron (spray and granular) 2 #, CDEC 6 #, and CDEC + chlorpropham 3 + 3 #, but severe injury was caused by Karsil [N-(3,4-dichlorophenyl)-2-methyl-pentanamide] 4 #, Dicryl [N-(3,4-dichlorophenyl)methacryl-amide] 4 # and Premerge [dinoseb(amine)] 4 and 6 #. In another pre-em. trial in an onion seedbed, good weed control without crop injury was obtained with Zytron 4 and 6 #; chlorpropham 10 # caused severe injury. In transplanted onions with pre-em. applications made as weeds were emerging, the best combined weed control and highest yields were obtained with Zytron 4 # and CDEC 8 #. D.M.L.S. [139(76.4)]

1550. van STAALDUINE, D. (Inst.voor Biol. Scheik,Onderz,LandbGew.,Wageningen,Netherlands). Onkruidbestrijdingsonderzoek bij de asperge-teelt in Nederland. [Weed control trials in asparagus in the Netherlands.] Meded.Landb-Hogesch.,Gent, 1960, 25,1451-62.

In trials in 1958 to control annual weeds in asparagus seedbeds, the following were applied (in 1000 l spray): monuron 0.8 and 1.6 kg/ha, diuron 0.8 kg, and simazine 0.5 kg on 6 May, just before sowing, and PCP in oil at 30 l/ha. PCP in oil 30 l + monuron 0.8 kg, + simazine 0.5 kg and + chlorpropham 2 kg, on 19 May, just before emergence. The soil had an organic matter content of 10%. The chief weeds were: Senecio vulgaris, Lamium amplexicaule, Stellaria media, Polygonum persicaria and Poa annua. Of treatments applied on 6 May, simazine 0.5 kg gave the best weed control and of those applied on 19 May, PCP + simazine and PCP + monuron were both effective. In the wet conditions of this season, re-treatment was necessary after the latter two treatments. Simazine gave the best control of Senecio vulgaris. No injury to the asparagus was noted.

In similar trials on loamy sand in 1959, in which monuron 0.8 kg and simazine 0.5 kg was applied pre-em. on 15 April followed, respectively, by re-treatment post-em. on 29 June with monuron 0, 0.8 and 1.6 kg and simazine 0, 0.5 and 1 kg, asparagus stands were satisfactory in all cases, though simazine appeared to be somewhat more injurious than monuron. After the re-treat-ment, control of weeds was good until the end of the season.

In trials on the control of perennial grass weeds in production asparagus beds, dalapon 8.5 and 17 kg and TCA 22.5 kg were applied to 10-year-old asparagus immediately after harvest (pre-em.) in 600 l spray in beds not levelled after harvest and on which Agropyron repens was 25 cm tall, and also post-em. at about 14 days after harvest on beds ploughed after harvest and on which the A. repens was 5-10 cm tall. Treatments made to ploughed beds were applied between the rows, only, as the asparagus plants were 10-100 cm tall. Both rates of dalapon, but not TCA, gave good control. Where the herbicides were applied before the asparagus stems emerged, no damage was noted, but later treatments after emergence caused some injury, especially in the case of TCA.

In a trial on sandy soils in 1959 with 3-year-old asparagus, dalapon 4.25, 8.5 and 12.75 kg/ha in 1000 l spray was applied overall to A. repens 15 cm tall. Rates of 8.5 and 12.75 kg applied in mid April gave satisfactory A. repens control until the end of September; two applications each of 4.25 kg in mid April and 5 August gave relatively poorer control. Applications of dalapon 4.25, 8.5 and 12.75 kg, simazine and atrazine 5 kg and monuron 8 kg were applied pre-em. on 26 June shortly after harvest, either on unploughed plots or on plots ploughed on 25 June. Best control of A. repens was given by dalapon 12.75 kg on unploughed plots, though control on ploughed plots was only slightly inferior. Atrazine gave very good top kill, but little rhizome kill. Rainfall during July to November was very small in these trials. From these results, it was concluded that monuron 0.8 and simazine 0.5 kg were practical treat-ments for controlling annual weeds when applied pre-em and again post-em. to asparagus 5-10 cm tall. PCP in oil ± simazine or monuron was also effective as a pre-em. treatment. For controlling perennial grasses in production beds on sandy soil, dalapon 8.5 kg as a directed spray applied immediately after harvest was an effective practical treatment. One treat-ment per year appeared to be sufficient. P.J.B. [215(492)]

1551. KROLL, P.W.U. (Pyrethrum Res.Sta., Molo,Kenya). The use of dalapon in the

cultivation of pyrethrum. Proc.Couch Control Conf.E.Afr.Agric.Res.Org., 1960, 38-40.
See Weed Abstr.10:689. [O.W.]

1552. van STAALDUINE, D. Onkruidbestrijding in aardbeien met simazine? [Weed control in strawberries with simazine?] Groenten en Fruit, 1959, 15,(7),209.
Tentative recommendations are given for the use of simazine in strawberries. P.J.B. [229(492)]

1553. BAYER, D. Weed control in ornamental horticulture. J.Calif.Hort.Soc., 1960, 21, (4),133-4,149.
Brief notes are given on a number of common weeds of ornamental crops in California, with recommended control measures. Against Oxalis spp., fenoprop has been more effective than 2,4,5-T and against Cerastium viscosum, fenoprop has been more effective than 2,4-D. For Cynodon dactylon control in turf, spot-spraying with amitrole or dalapon is recommended, but repeated applications of dalapon at low rates have eradicated it from dichondra turf. - M.G.G. [227(79.4)]

1554. HOOGETERP, P. De onkruidbestrijding in gladiolen. [Weed control in gladioli.] Weekbl.Bloembollen Cult., 1960, 70,740.
Recommendations are given which include the following: (a) PCP in oil 30 l/ha + chlorpropham 4 l just before emergence, in 1000 l spray; (b) MCPA (dose according to instructions) + chlorpropham 4 l/ha, in 1000 l spray, applied a few days before emergence (more suitable for large areas of crop, owing to risk of spray drift); (c) DNOC 5 kg + chlorpropham 4 l, immediately before emergence. Also discussed is dimethyl xanthogen disulphide, applied immediately before emergence at 25 l/ha. This is stated to be similar to PCP in oil in effectiveness. P.J.B. [226(492)]

1555. DIAMOND ALKALI COMPANY. (Diamond Alkali Company, Painesville, Ohio, U.S.A.). Dacthal (DAC-893). Experimental pre-emergence herbicide. Res.Bull.Diamond Alkali Co., 1961, pp.6, tabs.1.
This is a revision of the bulletin abstracted in Weed Abstr.9:1823. It includes the following additional information: Dacthal (dimethyl-2,3,5,6-tetrachloroterephthalate) is available as 50% wettable powder, 1.5 20/40 mesh granular (G-1.5) or 5% 30/60 mesh granular (G-5). At 4-8 # good control of a number of weed species (listed) including Panicum texanum was obtained, but only variable control of Amaranthus retroflexus. Further trials on turf showed that Dacthal adversely affected the germination of grass seeds and it is recommended that it should be applied 2-4 weeks after the grass seeds, but before the weed seeds, have germinated. For annual bluegrass [Poa pratensis], spurges [Euphorbia spp.] and goosegrass [Galium sp.] in turf, wettable powder 10, 15 or 20 # in 100-200 gal/ac is recommended. For crabgrass [Digitaria sp.] in turf, wettable powder or 1.5% granular 5, 10 or 15 # is recommended. Crabgrass, purslane [Portulaca oleracea] and other unspecified broad-leaved weeds have been controlled in 80 ornamental and tree species (listed). Growth of the following was stunted: Pyrethrum sp., cigar flower [Cuphea ignea], Avens [Geum sp.], periwinkle [Vinca sp.] sweet william [Dianthus barbatus], carnation [Dianthus sp.], bugle-weed [Ajuga sp.] lavender [Lavandula sp.], Germander speedwell [Veronica chamaedrys] and Pansy [Viola sp.]. Phlox sp. and Siberian iris [Iris sp.] were intolerant. In further trials Dacthal wettable powder 4-12 # gave promising results with rice, cabbage and carrots, while birdsfoot trefoil, flax, lespedeza, and white clover were intolerant. Dacthal 5% granular, applied in early spring is recommended for strawberries. - M.G.G. [O.W.]

1556. CHAPPELL, W.E. Crabgrass control in turf. Res.Rep.Va.agric.Exp.Sta.1957-9, 1960, 229.
Dimethyl-2,3,5,6-tetrachloroterephthalate (Dacthal) 6 and 12 #, calcium arsenate 400 and 800 # and O-(2,4-dichlorophenyl)-O-methylisopropylphosphoroamidothioate (Zytron) 10 and 20 # applied pre-em. gave between 53% and 100% control of crabgrass (Digitaria spp.) without injuring bluegrass [Poa pratensis]. From Herb.Abstr. 31:1254. - J.W.F.

1557. AHRENS, J.F. and OLSON, A.R. Find chemicals work in crabgrass control. Flor.Exch., 1960, 135,(26),19,23.
Applications of Dacthal (dimethyl 2,3,5,6-tetrachloroterephthalate, Zytron (O-(2,4-dichlorophenyl)-O-methylisopropylphosphoramidothioate) or calcium arsenate as dry powders in late April or early May to experimental plots infested with crabgrass [Digitaria spp.] gave $\geq$95% control. Repeated applications may be necessary in plots where crabgrass seedlings have emerged. None of the herbicides tested were effective against crabgrass in a newly

sown lawn. From Hort.Abstr.31:5057. J.W.F.

1558. van de LAAR, H.J. (Proefst.voor de Boomkwekerij,Boskoop,Netherlands). Chemische onkruidbestrijding in de boomkwekerij. [Chemical weed control in the tree nursery.] De Boomkwekerij, 1960, 16, (3),28-32, figs.5,tabs.4.

Observations are made on the use of DNOC, PCP in oil, herbicidal oils, chlorpropham and simazine for weed control in tree and shrub nurseries. Species sensitive to foliar sprays of simazine include Acanthopanax, Callicarpa, Cornus, Cotoneaster, Deutzia, Eleagnus, Euonymus, Forsythia, Hydrangea, Laburnum, Ligustrum, Philadelphus, Prunus, Robinia, Spiraea, Symphoricarpos and Syringa. No coniferous species so far tested have shown sensitivity to simazine. Tables give weeds poorly, moderately and well controlled by DNOC 5 kg/ha, PCP in oil 30 l and herbicidal oil at 800 l/ha, applied to moderate weed infestations and weeds poorly, moderately and well controlled by chlorpropham 4 l/ha and simazine 1 - 3 kg applied to soil free from weeds or with weeds in the seedling stage. Practical recommendations are given for chemical weed control in nursery beds and in seedbeds before and after crop emergence, and for spray volumes. - P.J.B. [216(492)]

1559. HAWAIIAN SUGAR PLANTERS' ASSOCIATION. Weed control. Rep. Hawaiian Sug. Planters' Assoc.Exp.Sta., 1959, pp.80, figs.75,tabs.28.

pp.64-75. In field screening tests simazine 4# and ipazine 4# both pre-em. (of weeds)gave control of weeds in sugarcane equal to monuron and diuron applied at the same rates. 2,4-D amide and MCPA gave control equal to that with other forms of 2,4-D. EPTC 20-25#, amitrole, dalapon diethylene glycol (applied to strains of Cynodon dactylon susceptible to dalapon sodium) and TBA 10-20# (applied for control of Passiflora mulchella and Convolvulus arvensis) gave control only when applied at rates injurious to the crop. P. mulchella is tolerant of all other herbicides so far used, except methyl bromide under cover, which is uneconomical. Trials have begun with several triazines and Du Pont 685 (1-chloro-N'-(3,4-dichlorophenyl)-N,N-dimethylformamidine) and preparatory studies made with various herbicides, including pentachlorobenzenethiol, pentabromophenol, Inverton (invert emulsion of 2,4,5-T), Garlon (dalapon diethylene glycol ester 4 lb/gal + fenoprop polypropylene glycol butyl ether ester 0.5 lb/gal), a new group of fluorine analogues of 2,4-D, and ACP 617 (mixture of amitrole + sodium pentachlorophenate). The effects on the cane varieties 49-5 and 37-1933 of monuron, diuron and simazine 3.5, 7, 14 and 28 lbs per 1.5 ac-ft (2.5, 5, 10 and 20 p.p.m. air-dry soil) were tested on 10 soils. Simazine caused least damage and monuron most, though the tolerance levels of the two varieties differed; plants in soils with high organic matter and phosphate (P_2O_5 > 200 p.p.m.) content and pH of >7.0 suffered the least damage. In similar trials, no injury was caused by amitrole 50-200 p.p.m. mixed with the soil, but 2,4-D at the same rates caused slight root damage. Strains of Cynodon dactylon which have developed resistance to dalapon were controlled by monuron 25 #. Similarly, 2,4,5-T 5 # gave 100% control of 2,4-D-resistant strains of Commelina diffusa. Preparations of PCP and methyl bromide emulsions, the reduction of drift in oil sprays by the addition of 1-2% by weight of aluminium stearate, new surfactants, emulsifiers for invert emulsions, prevention of corrosion, and analytical methods for a number of herbicides, are briefly discussed. Nozzles and minimum pressures are recommended for low-pressure spraying of 2,4-D to reduce drift. A herbicide applicator with a capacity of 200 gals, mounted on a 4-wheel, all-wheel drive tractor equipped with tyres 36 in. in diameter X 20 in. wide, is described. Bagasse pith is suggested as a possible absorbent for herbicides. - M.G.G. [O.W.]

1560. ISAAC, K.V. and BJORKING, L.B. (Uganda Sugar Factory Ltd.,Uganda). Couch grass control in sugar cane. Proc.Couch Control Conf.E.Afr.Agric.For.Res.Org., 1960, 33-8.

In plant cane, pre-planting applications of Dowpon [dalapon 85%] 15 and 20 # in single or split doses injured the cane; 10 # was less effective against Digitaria scalarum, but caused no adverse effect and was better than 5 + 5 #. In dry weather 50 gal water/ac was better than 40 gal/ac.

Applied post-planting when cane was 2-3 in. high, Dowpon 10 # was very successful and caused only negligible injury; no cultivations were done for ca.45 days. In ratoons, spraying was done after trash lining, when ratoons were ca. 6-8 weeks old.

In general, Co and NCo varieties were unaffected by Dowpon 10 #, but POJ, M and B varieties showed toxic effects. Rates over 10 # were harmful to the cane and the effect was more pronounced if TCA was added to Dowpon.

Mr. Bjorking described the weed problem in irrigated sugar on the Arusha Chini Estate

and spoke of the need for a residual herbicide which could be sprayed in the tertiary irrigation furrows. - D.M.L.S.

1561. LERCHE, K. (Sisal Res.Sta.,Thika, Kenya). Control of couch grass in sisal. Proc.Couch Control Conf.E.Afr.Agric.For. Res.Org., 1960, 28-33.

TCA has proved too toxic for use in sisal. Dalapon 10 # has given effective control of couch [Digitaria scalarum] except where prior tine cultivation had resulted in concentrations of rhizomes under the soil surface. Dalapon 15 # + further spot-sprayings at ca. 0.5 # has also maintained control. It is recommended that couch should be controlled before planting sisal and that sisal plants should not be wetted during spot-sprayings.

Dalapon + MCPA caused serious deformities in sisal; dalapon + amitrole caused severe chlorosis, but the plants completely recovered.

In the discussion that followed it was stated that in the Kericho area, Imperata cylindrica had not been controlled by 3 applications of dalapon at 20, 10 and 10 #, respectively, whereas in the high rainfall area of Malaya it was easily controlled by 1 application of 10-12 #. - D.M.L.S. [O.W.]

1562. HOWARTH, N.L. (Kenya Tea Co.Ltd., Kenya). The use of dalapon in tea cultivation. Proc.Couch Control Conf.E.Afr.Agric.For.Res. Org., 1960, 21-8.

Infestation of couch [Digitaria scalarum] over the whole (ca. 156 ac) of the Jamji Estate has been controlled by 4 applications of dalapon 10 #, the first being made after pruning of tea bushes and before bud-burst, the second when new couch growth was 3-6 in. high, and the third and fourth at subsequent 4-monthly intervals. Costs are given and compared with those of forking.

In the discussion which followed the paper, the author said that no significant effect on tea yield had been observed. It was generally agreed that Indian tea was more susceptible to dalapon injury than China hybrids, and that tea and coffee were both more susceptible to normal dalapon treatment when heavily infested (probably because debilitated) and that it might be advantageous to reduce the dosage of dalapon or apply fertilizer to assist recovery. D.M.L.S. [O.W.]

1563. WALLIS, J.A.N. and THOMAS, D.G. (Coffee Res.Sta.,Ruiru,Kenya). Control of perennial grasses in coffee. Proc.Couch Control Conf.E.Afr.Agric.For.Res.Org., 1960, 13-21.

Where applied uniformly, up to 8 # of commercial dalapon [78% dalapon] has been used in Kenya with consistent safety in coffee. Abnormal growth has been observed following (a) more than 10 # (commercial formulation) applied to mature coffee, (b) where coffee seedlings have been planted in soil treated with more than 10 # during the previous 2 months, and (c) where the spray has fallen on leaves or young stems. Toxic symptoms following (1) 10-15 #, (2) 15-20 # and (3) over 20 #, are described. Slashing of Digitaria scalarum prior to dalapon application is not likely to improve the effect when weather is favourable to growth but may be beneficial before a dry period. After a first application of dalapon 7 #, couch should be cultivated 3 weeks later and a second application of 5 # made 10 days later. This is usually sufficient, but a third application of 3-5 # may occasionally be necessary.

In Uganda, in an area badly infested with D. scalarum, rotavating whenever the plant reached 8-9 in. in height (= every 6 weeks during the rains) gave a fairly high degree of control and greatly benefited the coffee trees, but destroyed the soil structure. From trials with dalapon, the following procedure is recommended: (1) preliminary cultivation with disc-harrow, rotavator, or plough; (2) application of dalapon 5 # in 60-100 gal water during rainy weather when D. scalarum is 6-8 in. high (ca. 2 hours of dry weather is necessary after spraying to allow spray to dry); (3) 6-8 weeks after the first application the weed cover is slashed and if necessary a second application of 5 # is given, otherwise spot treatment. Costs of rotavating and chemical treatment are given. - D.M.L.S. [O.W.]

BIOLOGY OF WEEDS AND POISONING BY WEEDS

1564. BÖRNER, H. (Landwirtschaftl. Hochschule,Stuttgart-Hohenheim,Germany). Über die Bedeutung gegenseitiger Beeinflussung von Pflanzen in landwirtschaftlichen und forstlichen Kulturen. [On the significance of the reciprocal influence of plants on one another in agriculture and forestry.] Angew.Bot., 1960, 34,(3/4), 192-211. figs.5,tabs.7,bibl.60.

Studies were made of interactions between

crop and weed species grown individually in pots, but sharing a common circulated culture solution. The growth inhibiting or promoting effect of root exudates upon neighbouring plants was demonstrated and in many cases substantiated, experiences gained under field conditions. The interactions between the following cereals and weeds were studied: Avena sativa and Sinapis arvensis, Secale cereale and Matricaria maritima, Secale cereale and Sinapis arvensis, Avena sativa and Papaver rhoeas, Triticum aestivum and Matricaria maritima, Secale cereale and Veronica persica, Secale cereale and Papaver rhoeas, Hordeum vulgare and Stellaria media, Triticum aestivum and Agropyron repens, Avena sativa and Matricaria maritima, Triticum aestivum and Veronica persica, Avena fatua and Secale cereale.

Interactions between Solanum tuberosum, on the one hand and Sinapis arvensis, Urtica urens, Stellaria media, Mercurialis annua and Senecio vulgaris on the other were thought to have been influenced by competition for nutrients, since in these cases a reduction in growth of S. tuberosum was accompanied by an increase in growth of the weed species.

The restrictive or inhibitive effect of root exudates on plant growth was considerably increased when one of the partner plants was introduced to the water culture solution approximately 14 days prior to the start of trials. This was noted in the following species: S. tuberosum and Chenopodium album, Polygonum persicaria and S. tuberosum, Centaurea cyanus and Triticum aestivum, Mentha arvensis and T. aestivum, Sonchus asper and T. aestivum, Agrostemma githago and Secale cereale, P. lapathifolium and S. tuberosum, and Convolvulus arvensis and T. aestivum. The growth-retarding effect of S. tuberosum on P. persicaria (94% reduction in weight of roots and tops) was particularly marked.

Previous related work described includes: so-called flax sickness caused by growing flax on soil from which several consecutive crops have already been taken, excretion of trans-cinnamic acid from the roots of Parthenium argentatum, production of phytotoxic substances by cereal residues, and soil exhaustion in peach, citrus fruit and apple orchards.

Root exudates responsible for the influence on growth of other plants were isolated by paper chromatography. The growth inhibiting factors in the exudates from the roots of Avena sativa, Prunus persica, and Pyrus malus, were scopoletine, juglone and phlorizine, respectively. - J.L.M. [O.W.]

1565. van den BERGH, J.P. and de WIT, C.T. Concurrentie tussen timothee (Phleum pratense, L.) en reukgras (Anthoxanthum odoratum L.). [Competition between timothy and sweet vernal grass.] Jaarb.Inst.Biol. Scheik.Onderz.LandbGew.1960, 1960, 155-65, bibl.6.

Tillers of Anthoxanthum odoratum and Phleum pratense were planted as mixtures in varying proportions, or as monocultures at different spacings, in pots and grown for 1 month at 6°C with 8 hours light/day, 2 months at 20°C with 17 hours light/day and cut to 4 cm when the plants were 20 cm tall, then for 1 month at 6°C and 8 hours light/day. The relative rates of vegetative reproduction for the 2 species were independent of their relative frequency of occurrence, but were not the same in mixtures as in monoculture. Under constant conditions the 2 species competed for exactly the same space. In similar trials in the open, the relative rate of vegetative reproduction appeared to depend on the relative frequency of the species; they appeared to compete for spaces which were not exactly the same, probably because of their differing growth periods. From Herb.Abstr.31:1380. - J.W.F.

1566. SELLECK, G.W. and COUPLAND, R.T. (Monsanto Chem.Co.,St.Louis,Missouri,U.S.A.). Studies in the life history of Artemisia absinthum. Weeds, 1961, 9,(3),485-90, tabs.2, bibl.5.

For abstract of an abridged version of this paper see Weed Abstr.9:1961. - D.M.L.S. [O.W.]

1567. CLEBSCH, E.E.C. (Duke Univ.,Durham, N.Carolina,U.S.A.). Comparative morphological and physiological variation in arctic and alpine populations of Trisetum spicatum. Ph.D.Thesis Duke Univ., 1960, pp.251, Microfilm $3.25, Xerox $11.50.

This species was found to exhibit low cover and low density in samples of tundra and meadow vegetation from central Colorado to northern Alaska. It has great morphological variation and is believed to be a vigorous, rapidly evolving, weedy species. From Diss. Abstr.21,(10),2865. - J.W.F.

1568. PARAMESWAR, N.S. Chromosome numbers in two Compositae weeds. Curr.Sci., 1960, 29,(9),360.

Vernonia anthelmintica and Lagasca mollis are considered. - P.J.B.

1569. TINGEY, D.C. and ALLRED, K.R. (State Univ.,Logan,Utah,U.S.A.). Breaking dormancy

in seeds of Cuscuta approximata. Weeds, 1961, 9,(3),429-36, figs.2,tabs.5,bibl.10.
The usual procedure of breaking dormancy in dodder seeds by either acid treatment or mechanical scarification was effective with C.indecora, but ineffective with small-seeded lucerne dodder (C. approximata). However, dormancy in C. approximata was readily broken by wet-chilling the seed at 35°-45°F for 2 weeks, following acid or scarification treatment. Acid treatment was consistently more effective than mechanical scarification in making C. approximata seed permeable to water. From summary. - D.M.L.S. [O.W.]

1570. BULL, L.B. et al. Heliotropium poisoning in cattle. Aust.vet.J., 1961, 37, (2),37-43,(illus.), bibl.1.
The relative susceptibilities of cattle and sheep to poisoning by Heliotropium europaeum are compared. - P.J.B.

1571. SHONE, D.K. Toxicity of the jack bean (Canavalia ensiformis). Rhod.agric.J., 1961, 58,(1),18-20, bibl.7.
As a result of feeding trials carried out on milch cows,it is recommended that meal composed of the herbage, seed and pod, or seed of Canavalia ensiformis should not exceed 30% of the ration. Herb.Abstr.31: 1169.

1572. AFFLECK, H. Jack bean (Canavalia ensiformis) poisoning in cattle. Rhod.agric. J., 1961, 58,(1),21.
Two instances are reported in Lomagundi, S. Rhodesia, of cattle deaths due to grazing Canavalia ensiformis. Herb.Abstr.31:1170.

AQUATIC AND WOODY WEEDS AND THEIR CONTROL

1573. NETHERLANDS, PLANTENZIEKTENKUNDIGE DIENST. Bericht over chemische bestrijding van waterplanten. [Report on the chemical control of aquatic plants.] Ber.PlZiekt Kundige Dnst,Wageningen, 1961, 1423,pp.7.
Recommended treatments for controlling Glyceria sp., Phragmites communis, Phalaris sp. and other grasses in ditches are: (a) dalapon 15 kg/ha in mid-May, with follow-up treatment with 10 kg/ha as required, or (b) a single application of dalapon 15-20 kg/ha during mid-July to September. The vegetation should not be mown after treatment until completely dead. For controlling Pistia stratiotes with most of the leaf above the water surface, MCPA 2 kg/ha is recommended, with a follow-up treatment 3 weeks later. For mixed weeds, treatment with dalapon 15 kg + MCPA or + 2,4- D 2 kg/ha is recommended. The best spray volume is 300 l, with medium-fine droplet size; with dense vegetation, higher spray volumes may be required. - P.J.B. [220(492)]

1574. BORAX CONSOLIDATED LTD. (Borax House,Carlisle Place,London S.W.1,England). Dalacide for the control of reads, rushes and sedges. Leafl.Borax Consolidated Ltd., [n.d.], pp.2.
Dalacide (78% dalapon + 8% 2,2,3-trichloro-propionate-sodium) is recommended for control of the following aquatic weeds at the rates given: Sparganium ramosum 20 # during summer, Glyceria maxima and G. aquatica 20 #, Phragmites communis 10-15 #, Juncus spp. and Scirpus spp. 15-25 #, Carex spp. 20-30 # (2 applications may be required), Typha spp. 25 #. The herbicide should be applied during periods of active growth with constant-pressure sprayers, e.g. 30-40 p.s.i. through 00 or 000 fan nozzles at 80 gal/ac, to give a complete coverage without excessive run-off. It can be used in combination with 2,4-D sodium or amine 2-4 # to give control of other broad-leaved weeds. Risk of contamination of water courses and poisoning of fish is negligible. Cattle should not graze freshly sprayed vegetation and care should be taken to avoid drift. - M.G.G. [O.W.]

OTHER WEEDS AND THEIR CONTROL

See also 1523.

1575. WIESE, A.F. and REA, H.E. (Southwestern Great Plains Field Sta., Bushland,Texas,U.S.A.). Control of field bindweed and other perennial weeds with benzoic and phenylacetic acids. Weeds, 1961, 9,(3),423-8, tabs.4,bibl.18.
The results of various trials during 1957 and 1958 are summarized. They indicated that fenac, 2,3,6-TBA and polychlorobenzoic acid (PBA 30%) containing 30% trichloro-, 54% tetrachloro-, 11% dichloro- and 5% pentachloro-benzoic acid, at 20, 20 and 40 #, respectively, were as, or more, effective in eradicating Convolvulus arvensis, Franseria tomentosa, Hoffmanseggia

densiflora, and Sida hederacea than sodium chlorate 800 #, anhydrous borax 2560 #, monuron 60 # or fenuron 60 #. Solanum eleagnifolium required 80 # of fenac for eradication and was not eradicated by any of the other treatments. At 5 #, fenac was much more toxic than 2,3,6-TBA to C. arvensis, but there was little difference in toxicity at 10 and 20 #. There was no great difference in the toxicity of fenac to C. arvensis when formulated as an amine salt, a sodium salt, an acid in an emulsifiable oil, or as a butylcellosolve ester, but the amide was less toxic. 2,3,6-TBA was equally toxic when formulated as a dimethylamine salt or as an acid impregnated on granules. At equal rates of application polychlorobenzoic acids containing a high % of 2,3,6-TBA were most toxic to C. arvensis. 2,3,6-TBA was as effective as PBA 30% when applied at half the dose of the latter. - D.M.L.S. [O.W.]

1576. WIESE, A.F. and REA, H.E. (Texas Agric.Exp.Sta.,Bushland,U.S.A.). Substituted benzoic and phenylacetic acids for field bindweed control. Proc.14th Southern Weed Conf. 1961, 1961, 61.

Studies since 1955 have indicated that fenac, 2,3,6-TBA and polychlorobenzoic acid (30% trichlorobenzoic acid) at 20, 20 and 40 #, respectively, were equally effective and at least as toxic, to Convolvulus arvensis as sodium chlorate at 800 #. The toxicity of chlorine-substituted benzoic acids was positively correlated with the amount of trichlorobenzoic acid, especially 2,3,6-TBA, present. Fenac appeared to have a longer residual effect in the soil than substituted benzoic acids. Fenac applied to dry-land soils in 1957 still prevented annual weed growth in 1960. Under conditions of heavy irrigation, fenac applications reduced crop yields for at least 2 years. Fenac did not leach through soil as readily as chlorine-substituted benzoic acids. P.J.B. [O.W.]

1577. McWHORTER, C.G. (Mississippi Agric. Exp.Sta.,Stoneville,U.S.A.). Johnsongrass growth study shows why it is so difficult to control. Miss.Fm Res., 1960, 23,(12), 6-7,(illus.).

Morphological development in terms of rhizome and seed production of Sorghum halepense is reported, together with observations on the effectiveness of dalapon (in 2% solution + 0.5% wetting agent) as a means of control when applied at various stages of growth. Field Crop Abstr.14:1436.

1578. *LEMKE, K. Bekampfung der Rasenschmiele (Deschampsia caespitosa). [Control of tussock grass (Deschampsia caespitosa).] Mitt.der Deut.Landwirt.-Gesell., 1959, 51, 1510-12.

1579. HOCOMBE, S.D. and IVENS, G.W. (Tropical Pesticides Res.Inst. Arusha, Tanganyika). Some experiments on the chemical control of Cyperus rotundus L. in Northern Tanganyika. Misc.Rep.Trop.Pest Res.Inst.,Arusha, [n.d.], 282, pp.15, tabs.3, bibl.3.

Fifteen herbicides, representing 4 basic molecular structures, applied from fanjet nozzles at 30 p.s.i. in 50-100 gal spray/ac, were tested, in most cases, on fallow land, in the following trials: (1) Comparison of 2,4-D amine and ester 1 or 2 # with amitrole 4 or 8 #, applied in July 1958 after cultivation and when Cyperus rotundus shoots were 2-3 in. tall. Re-treatments were made 5 and 10 weeks later. Up to 70% shoot kill was given by both herbicides, but growth continued in the rainy season from dormant tubers. (2) Comparison of 2,4-D amine 1, 2 and 4 #, MCPA 1 and 2 #, amitrole 4 and 8 # and EPTC (applied to the soil surface) 2, 4 and 8 # applied (a) in January 1959 when C. rotundus shoots were 6-12 in. tall and beginning to flower, with re-treatments of all herbicides except EPTC in early March; (b) in mid-April, with re-treatment by all herbicides except EPTC at the end of May. EPTC gave no control. Re-establishment of C. rotundus from dormant tubers occurred after 10 weeks following all other treatments. (3) Comparison of EPTC (not incorporated) and fenac, both applied 3 or 6 # in January 1959, 1 week after the area had been disced and when shoots of C. rotundus were emerging. Fenac at 3 # gave better control than EPTC 3 #, but gave less efficient and shorter lasting control at 6 #. Control given by EPTC 6 # was effective for 8 weeks. (4) Simazine, atrazine, simetryne, 2-methoxy-4-ethylamino-6-isopropylamino-s-triazine, ametryne, prometone, 2-methylmercapto-4,6-bis(isopropylamino)-s-triazine, 2-methoxy-4-methylamino-6-isopropylamino-s-triazine, 2-methylmercapto-4-methylamino-6-isopropylamino-s-triazine were applied in February 1960 at 2.5, 5 and 10 # to coffee plantations, 10 days after cultivation, when C. rotundus was 4 in. tall. C. rotundus was not affected by any treatment. (5) Comparison of amitrole and amitrole + NH_4SCN 5 or 10 #, applied in May 1960 2 weeks after cultivation when C. rotundus was 2-7 in. tall. Both herbicides killed many of the shoots present at the time of treatment, but had no effect on the tubers in the soil. (6) Comparison of 2,4-D amine

2 or 4 # with EPTC 4 or 8 # incorporated immediately, both applied in February 1960 when C. rotundus was 2-4 in. tall. EPTC gave control for 5 months after spraying, while 2,4-D gave poor control. (7) Comparison of liquid and granular formulations of EPTC 4 or 8 # incorporated within 10 minutes of application in August 1960 on ground which had been rotavated regularly during the previous year. Other weed seedlings were removed by hand. The granular formulation gave the most effective control of all the herbicides tested and gave control assessed as satisfactory for a 14-week period. - M.G.G. [11(678)]

1580. KRAMER, M. and LEIDERMAN, L. Observacoes sobre experiencias em andamento para a eliminacao da palmeira indaia por meios quimicos. [Observations on trials in progress for controlling the palm, Attalea exigua by chemical methods.] Biologico, S.Paulo, 1961, 27,(2),33-6,(illus.).
Attalea exigua is a noxious weed of pastures and fields in Sao Paulo State, Brazil. In trials near Sorocaba in 1960, 1 spray treatment, applied to the middle of the plants, of about 125 ml of 2,4,5-T ester, 0.75% a.e., or of a mixture of 2,4-D + 2,4,5-T, 0.9% a.e., in diesel oil, gave 100% kill of this weed. Field Crop Abstr. 14:1453.

1581. GESHELE, E.E. Osobennosti premeneniia khimicheskogo sposoba bor'by s sorniakami v Zapadnoi Sibiri. [Features of the use of chemical methods of weed eradication in Western Siberia.] Zemledelie, 1960, 5,56-8.
As a result of experiments carried out on the use of sodium salts of 2,4-D and MCPA, it was established that weeds of W. Siberia are more resistant to herbicides than in analogous zones of the European part of the USSR (steppes and wooded steppes). The high resistance is explained by the predominance of dry weather in the spring and cold in the first half of the year, and also by the solonetz character of the Siberian soil. Because of insufficient water in the steppe regions it is recommended that the normal application volume of solutions for spraying be reduced from 75-50 l/ha. From Biol.Abstr. Sect.D, 36:46175. - J.W.F.

1582. HOFFMANN, O.L. (Spencer Chem.Co., Kansas City,Missouri,U.S.A.). Breaking wild oat dormancy with gases at high pressure. Weeds, 1961, 9,(3),493.
Avena fatua seed subjected for 15 minutes to pressures of 10,000 p.s.i. hydrogen and ethylene, followed by the sudden release of pressure, showed 78 and 62% germination, respectively, compared with 4% for untreated and 62% for tip-clipped seed. Hydrogen treatment caused slight injury to seed, however, and ethylene treatment was therefore adopted as standard practice. Germination with ethylene in 3 series of trials averaged 65%. Germination reaches a maximum after ca. 2 weeks. - D.M.L.S. [O.W.]

1583. van DORD, D.C. and ZONDERWIJK, P. (Plantenziektenkundige Dienst,Wageningen, Netherlands). Kiemplantentabel van akkerondruiden. [Seedling plant table of arable weeds.] Meded.PlZiektKundige Dnst., [n.d.], 111,Bijlage,pp.60.
Line illustrations are given as a guide to the identification in the field of 7 grass and 69 broad-leaved weeds of arable land, together with brief indications of their occurrence and distribution in the Netherlands. - P.J.B. [W19(492)]

CHEMISTRY, PHYSICS, TOXICOLOGY, RESIDUES AND SOILS

1584. GEIGY, S.A. Atrazine. Inf. Pamphl.,Geigy,Basle, 1959, pp.22.
Melting point of pure atrazine is 173-175°C and of technical grade atrazine (98% of pure) 171-174°C. Solubility in water is 0.007%, in ethyl ether 1.2%, in chloroform 5.2%, in methyl alcohol 1.8% and in n-pentane 0.036%. Atrazine is very stable under normal storage conditions and also at room temperature in the presence of alkalis and dilute mineral acids. On raising the temperature or increasing the concentration of alkalis and mineral acids, the chlorine atom is replaced by the hydroxyl group. Atrazine is non-flammable and non-corrosive. It is available as a 50% wettable powder (A 361) and, for aquatic weed control, as 2% atrazine on sand (A 863).
The LD 50 for oral toxicity is 1750 mg/kg for mice and 3080 mg/kg for rats. Subchronic percutaneous tests show that atrazine is without danger (acute toxicity) for warm-blooded animals.
Atrazine can be absorbed by plants through both roots and leaves and is most toxic to germinating plants. It is more effective than simazine under dry weather conditions.
The susceptibility of 118 weed spp. is tabulated and the results of preliminary

trials in the following crops described: vines, asparagus, red currants, apples, pears, Berberis sp., Buxus sempervirens, Cotoneaster microphylla W., Euonymus europaeus, Juniperus sabina L., Prunus laurocerasus, Rosa spp., 20 bush and tree spp., maize, and millet. The results are also given of a trial in which the residual effect of atrazine was tested on 34 crop spp. - D.M.L.S. [O.W.]

1585. ROHM AND HAAS COMPANY, PHILADELPHIA. STAM F-34. Agricultural post-emergence herbicide. Tech.Bull.Rohm & Haas Co., 1961, pp.3.

STAM F-34 is a 25% emulsifiable concentrate based on 3,4-dichloropropionanilide. Technical STAM is a solid with a setting range of 85°-90°C. It is only very slightly soluble in water, but is more soluble in various organic solvents. The acute oral LD 50 for rats is 1384 ± 99 mg/kg of body weight and for rabbits 520 ± 20 mg/kg. STAM F-34 contains organic solvents which may be irritating to skin or eyes.

It has shown selectivity for rice and for some turf grasses, but some injury may be caused to bluegrass [Poa pratensis] and fescue if applied at temperatures over 90°F or if too much is applied. To control barnyard grass [Echinochloa crusgalli] and other weeds in rice 3 # a.i. should be applied when E. crusgalli is at the 1-3 leaf stage, which is generally 5-15 days after rice emergence. Leaf injury may be caused to rice if applied after the rice has reached the 4-leaf stage but plants recover quickly. Spray should not be applied to flooded fields and treated areas should not be flooded for 1-2 days after application.

To control crabgrass [Digitaria sanguinalis] and other annual grasses and chickweed [Stellaria media] in turf, 3-4 # is recommended when crabgrass is in the 3-5 leaf stage, with 1 or more repeat applications at intervals of ca. 3-4 weeks as new crabgrass emerges.

Normal precautions should be taken against drift. - D.M.L.S. [O.W.]

1586. COOPER, E.A. (Michigan State Univ., East Lansing,U.S.A.). The synthesis of derivatives of 3-amino-4-H.1.2.4-triazole. Ph.D.Thesis,Mich.State Univ., 1959, pp.73, Microfilm $2.75, Xerox $4.00, bibl.8.

The synthesis is described of 3 different series of compounds having varied substituents in the fifth position in 3-amino-4-phenyl-4-H,1,2,4-triazole. From Diss.Abstr. 21,(11),3264.- J.W.F.

1587. MARTIN, F., VERTALIER, S. and CAMIER, J. (Soc.Usines Chim.Rhone-Poulenc, 9 quai Jules-Guesde,Vitry-sur-Seine,France). Determination par chromatographie en phase gazense des acides methyl-2-phenoxy-acetique, methyl-2-phenoxy-isopropionique, methyl-2-phenoxy-butyrique et de leurs derives monochlores en 4 ou en 6 et dichlores en 4 et 6. [Determination by gas phase chromatography of the acids 2-methylphenoxyacetic, 2-methylphenoxyisopropionic, 2-methylphenoxybutyric and their 4- and 6-monochloro- and 4,6-dichloro derivatives.] Bull.Soc.chim.Fr., 1960, 2067-71, figs.6,bibl.5.

The technique described entails the conversion of the constituents of phenoxyacetic, phenoxy isopropionic and phenoxy butyric herbicides and mixtures thereof into the free acid form, followed by methylation with diazomethane and separation of the active principles by gas chromatography. Mixtures of acetic and isopropionic derivatives can be separated on either (a) silicone oil or (b) diethyleneglycol succinate. Complex mixtures of acetic, isopropionic and butyric derivatives require successive fractionation on both (a) and (b). The time taken for an analysis is 2 hours. The precision is of the order of 5% and it is possible to detect 0.02% of a given constituent in a commercial mixture. - P.J.B. [122(44)]

1588. SCHULDT, P.H., BURCHFIELD, H.P., STALLARD, D.E., PRIDDLE, W.E. and KLEIN, S. (Diamond Alkali Co.,Res.Center,Painesville, Ohio,U.S.A.). Colorimetric determination of micro amounts of dimethyl tetrachloroterephthalate. Contrib.Boyce Thompson Inst., 1961, 21,(3),163-73, figs.3,tabs.5,bibl.6.

A procedure is described for the photometric analysis of dimethyl tetrachloroterephthalate in which it is caused to react with Y-(4-nitrobenzyl) pyridine in the presence of pH4 phthalate buffer for 1 hour at 120°C, followed by the addition of pyridine and triethylamine. Concentrations of 1-4 µg/ml gave colours which followed Beers' law satisfactorily and had an absorption maximum at 565 mµ. Development of optimum reaction conditions is described. Dimethyl tetrachloroterephthalate can be extracted from soil and plant homogenates by dichloromethane. Most interferences can be removed by successive partitioning between acetonitrile and n-heptane, decolorizing with Norit A and chromatographing on activated alumina. Recoveries of known amounts of dimethyl tetrachloroterephthalate added to homogenates of cotton seed, sweet potatoes and onions were 75-100% over the range 0.25-3.75 p.p.m. Recoveries from air-dry soil were 80-90%. Where the herbicide was applied as 50% wettable powder or 1.5%

granular formulations to turf, plots treated with 10 # retained 1.8 and 10.3% respectively, of the original amount applied 1 year later and 4.2 and 13.1% of the original where 20 # had been applied. - P.J.B. [O.W.]

1589. ANDERSON, L.D. and ATKINS, E.L. (California Univ.Citrus Expt Sta.,Riverside, U.S.A.). Pesticides hazardous to honeybees. Publ.Univ.Calif.Agric.Ext.Serv., [n.d.], OSA 72, pp.2.
The following herbicides are listed as highly toxic to bees: lead arsenate, dinoseb, and the following as relatively non-toxic: amitrole, dalapon, propham, MCPA, monuron, naptalam, 2,4-DES, 2,4-DEB, simazine, 2,4-D and 2,4,5-T. - M.G.G. [226(79.4)]

1590. BURNSIDE, O.C., SCHMIDT, E.L. and BEHRENS, R. (Univ.,Lincoln,Nebraska,U.S.A.). Dissipation of simazine from the soil. Weeds, 1961, 9,(3),477-84, tabs.7,bibl.14.
Applying 1 and 2 in. of water following application of simazine at 2 # resulted in levels of 4, 2, 1 and 0 p.p.m.w. and 4, 4, 1 and 1 p.p.m.w., respectively, at the 0-0.5, 0.5-1, 1-3, and 3-6 in. soil depths, as determined by bio-assay. Doubling the herbicide rate, resulted in an increase in the amount of simazine leached into the 0.5-1 in. depth by the 1 in. application of water.
Decreased growth inhibition resulted with 3 successive soybean crops, each grown for a 30-day period on soil treated with 2 and 4 p.p.m.w. of simazine; the trend was less pronounced when 8 p.p.m.w. was used; 1 p.p.m.w. did not inhibit growth of the third crop. The reduced phytotoxicity was attributed to reduced plant uptake.
High temperatures (212° and 248°F) and, to a lesser extent, low pH (pH 4) caused a significant deactivation of simazine in water suspensions; however, the results indicated that loss of phytotoxicity would be unlikely at normal soil temperatures. Loss of simazine by volatilization was not detectable even when simazine suspensions were boiled.
At rates up to 4096 p.p.m.w., simazine had little effect on the overall or on the nitrifying activity of microorganisms in Waukegan silt loam soil. Deactivation of simazine occurred under conditions conducive to microorganism growth, but not in sterile or frozen soil; the phytotoxicity of 4 p.p.m.w. in non-sterile silt loam soil at field capacity was reduced 90% during 10 months at 85°F. Five microorganisms that were able to subsist for 3 months in media containing simazine as the sole source of nitrogen and nearly the sole source of carbon failed to deactivate simazine in solution cultures during a 30-day incubation period. - D.M.L.S. [O.W.]

1591. BURSCHEL, P. (Inst.für Waldbau-Technik der Forstlichen Fakultät,Univ. Göttingen,Germany). Untersuchungen über das Verhalten von Simazin im Bochen. [Experiments on the retention of simazine in the soil.] Weed Res., 1961, 1,(2),131-41,(G.e.f.), figs.3,tabs.5.bibl.4.
When applied to soil samples containing 10% humus and a moisture content of 20%, simazine at concentrations of 2 and 4 p.p.m. underwent 50% decomposition within almost the same time, taking about 20, 40, and 140 days at temperatures of 25°, 18° and 8.5°C, respectively. It was concluded that the decomposition of simazine was a first-order reaction and that the same % of the original dosage would remain after a given period of time, irrespective of the initial rate of application. The time taken for decomposition was doubled by reducing the temperature from 25° to 18°C, and increased 3.5-fold by reducing it from 18°C to 8.5°C. Under similar experimental conditions with soil samples containing 10%, 5% and 1% humus, at 18°C simazine at 2 p.p.m. suffered 50% decomposition in 40, 57, and 118 days, respectively, while in soil containing no humus and at temperatures up to 25°C, the original amount of simazine applied was still present after 105 days. Simazine 1 kg and 10 kg/ha, respectively, was applied to plots on clay, sandy loam, and sandy soil, which were then watered for several days to correspond to rainfall amounts up to 100 cm. The greatest concentrations of simazine were found in the top 2 cm of soil, irrespective of soil type, though detectable amounts were present at a depth of 10 cm in clay and sandy loam soils, and at 16 cm in sandy soils. In field trials, simazine applications of 1 kg and 10 kg/ha both decomposed to the extent of 40% within 50 days, and to the extent of 94% and 83%, respectively, within 103 days, the greatest amount of residue being found in the top 2 cm of soil, in each case. - J.L.M. [O.W.]

1592. DANIELSON, L.L., GENTNER, W.A. and JANSEN, L.L. (U.S.Dep.Agric.,Beltsville, Maryland,U.S.A.). Persistence of soil-incorporated EPTC and other carbamates. Weeds, 1961, 9,(3),463-76.
1. Field studies indicated that when soil-incorporated at 1-16 # in 33 gal. water EPTC and CDEC retained their herbi-

cidal properties and persisted at effective rates for more than 4 weeks. EPTC was more persistent than CDEC on the basis of bio-assay responses. Chlorpropham, sec-butyl N-(3-chlorophenyl)carbamate, 2-chloroethyl-N-(3-chlorophenyl) carbamate, and isopropyl N-(3-methylphenyl)carbamate were relatively inactive.

2. Ryegrass bio-assay glasshouse tests showed that EPTC persisted longer in a soil with relatively high organic content than in one with relatively low organic content. When compared with sub-irrigation, top irrigation greatly hastened dissipation of EPTC in the heavy soil, but did not materially affect dissipation rate in the lighter soil.

3. EPTC persistence was strongly influenced by the solvent-carrier system used in application. The most persistent systems of those tested were commercial EPTC in water and technical EPTC in acetone, benzene, and xylene. Technical EPTC in kerosene was the least persistent, and in fuel oil, was intermediate. The persistence characteristics of commercial EPTC in water and technical EPTC in kerosene were confirmed in field studies.

4. High soil temperatures appear to increase the rate of dissipation of commercial EPTC applied in water on a soil relatively high in organic matter. Temperature did not appear to affect rate of dissipation of technical EPTC applied in kerosene.

5. EPTC persistence was affected by the addition of specific surfactants and by their concentration. Surfactant action, when present, resulted in increased persistence of EPTC in a kerosene solvent system.

6. The total persistence of EPTC appears to be a complex function of the EPTC dose, the solvent, the specific surfactant and the surfactant concentration. - D.M.L.S. [116(75.2)]

1593. DAY, B.E., JORDAN, L.S. and HENDRIXSON, R.T. (Citrus Exp.Sta.,Univ. Calif.,Riverside,U.S.A.). The decomposition of amitrole in California soils. Weeds, 1961, 9,(3),443-56, figs.10,tabs.1, bibl.5.

Adsorption, phytotoxicity, rates of leaching, and persistence of amitrole as affected by variations in soil type, temperature, moisture, and sterilization by steam were studied in soils collected from California citrus districts. In 55 soils studied, adsorption of amitrole was usually less than 20% of the amitrole added and only rarely greater than 50%. The adsorption was found to be readily reversible, and amitrole could be quantitatively leached from soils by continued percolation with water. The rate of down-ward leaching of the amitrole relative to the movement of the water was retarded in proportion to the capacity of the soil to adsorb amitrole.

Rates of decomposition of amitrole in steam-sterilized soils were much lower than the rates in unsterilized soils indicating that the decomposition is primarily due to the action of soil microorganisms. The microorganisms concerned have a temperature optimum between 20°C and 30°C. Decomposition of amitrole was slower at low than at medium and high soil-moisture levels.

Rates of decomposition of amitrole were highly variable among the soils studied, apparently because of differences in populations or levels of activity of the soil microorganisms concerned. Amitrole decomposition was not closely related to soil classification, texture, base exchange capacity, or amitrole adsorption capacity, although there was some correlation with all of these factors.

A short residue life for amitrole was more frequently found in the more highly evolved soils of the coastal and inland valleys having finer textures and more highly developed colloidal properties than in the lighter, desert, and recently alluvial soils. Authors Summary. [O.W.]

APPLICATION AND MACHINERY

1594. RIPPER, W.E. (Dow Agrochemicals Ltd., Kings Lynn,Norfolk,England). The mode of action and effect of wetting agents on the herbicidal activity of dalapon. Proc.Couch Control Conf.E.Afr.Agric.For.Res.Org., 1960, 4-13, bibl.10.

A review. The use of wetting agents and penetrants considerably enhances dalapon activity and it has been decided by the Dow Chem. Co. to increase the concentration of surfactants in their British product. Experimental samples of a granular dalapon would be available in 1960. The influence on dalapon activity of soil type, alkalinity of water and weather conditions was discussed, following reading of the paper. - D.M.L.S. [O.W.]

1595. LILLIE, D.T. (U.S.Dep.Agric.,Tempe Arizona,U.S.A.). A carbon dioxide pressured portable field sprayer. Weeds, 1961, 9,(3), 491-2, figs.1.

The sprayer, which is described in detail and illustrated, has proved convenient and effective for field tests, particularly in steep and remote areas. It consists of a boom, tank, and carbon dioxide cylinder mounted on a back-pack frame. Pressure in the CO_2 cylinders varied from 1000-1800 p.s.i. Total cost of the sprayer, exclusive of spray boom, was $154. - D.M.L.S. [O.W.]

1596. KNOWLTON, G.F. and DAVIS, D.W. How to clean 2,4-D from sprayers. Mimeo. Ser.Utah State Univ.Ext.Serv., 1961, 178, pp.1.
For orchard and larger equipment, flushing with sodium bicarbonate or soda ash (50:50 mixture of sodium bicarbonate and sodium hydroxide) or with activated charcoal, is recommended. For small, hand-spray equipment, household ammonia can be used. - P.J.B. [17(79.2)]

PHYSIOLOGY, MORPHOLOGY AND ANATOMY

1597. GOWING, D.P. and LEEPER, R.W. (Pineapple Res.Inst., Hawaii, Honolulu). Studies on the relation of chemical structure to plant growth-regulator activity in the pineapple plant. 4. Hydrazine derivatives, compounds with an unsaturated aliphatic moiety and miscellaneous chemicals. Bot. Gaz., 1961, 123,(1),34-43, figs.2,tabs.3, bibl.27.
The results are given of tests of 39 hydrazine derivatives, 30 compounds with an unsaturated aliphatic moiety and 117 miscellaneous compounds. Data are given of their activity in inhibiting flowering and their phytotoxic effect and also, in the case of many compounds, the results of split pea-stem curvature tests. The compounds tested included monuron, DCU, EPTC, chlorpropham, propham, 2,3-dichloroisobutyric acid, dalapon, allyl alcohol, acrolein and S-(carboxymethyl) dimethyldithiocarbamate. - P.J.B. [O.W.]

1598. VENDRIG, J.C. and BUFFEL, K. (Lab. voor Plantenphysiologie, Carnoy Inst., Louvain, Belgium). Growth-stimulating activity of trans-caffeic acid isolated from Coleus rhenaltianus. Nature,Lond., 1961, 192, (4799),276-7, bibl.7.
Evidence is given which supported the suggestion that caffeic acid in plant tissues may be an important growth regulator and not less important than IAA in this respect. The growth-regulating activity of trans-caffeic acid is contrasted with the inactivity of trans-cinnamic acid (only the cis isomer of cinnamic acid is physiologically active). The extreme difference in activity between trans-caffeic and trans-cinnamic acid is considered to indicate the special importance of the ortho-diphenol configuration in growth regulation. - P.J.B. [O.W.]

1599. KOZLOVA, N.A., ERMOLAEVA, E.YA. and BATSKA, P. Effect of maleic acid hydrazide on flowering of Perilla ocymoides in a long-day environment. Doklady Akad.Nauk.SSSR (Bot.Sci.Sect.Transl.), 1960, 130,(1/6),22-4,(illus.).
MH, depending on its concentration and the plant's age, appeared to be an inhibitor as well as a stimulator of growth. In given concentrations, it caused the transition of typical short-day plants to a reproductive stage when in a long-day environment. The reason is an acceleration of leaf aging induced by MH, which then causes premature aging of the entire plant. From Biol.Abstr. Sect. D, 36:38633. - J.W.F.

1600. JACKSON, W.T. (Dartmouth Coll., Hanover, New Hampshire, U.S.A.). Effect of 3-amino-1,2,4-triazole and L-histidine on rate of elongation of root hairs of Agrostis alba. Weeds, 1961, 9,(3),437-42, tabs.3, bibl.11.
The rate of elongation of root hairs of Agrostis alba seedlings is virtually unaffected by 10^{-5} to 10^{-1} M amitrole during the first hour of treatment but is strongly reduced by 10^{-2} and 10^{-1} M amitrole during the second hour and particularly during the latter half of this hour. The inhibition induced by 10^{-2} M amitrole can be partially overcome by the simultaneous addition of 10^{-5}-10^{-3} M L-histidine. Compared with the rate of elongation in 10^{-2} M amitrole during the period 90-120 minutes after treatment, the rates in 10^{-2} M amitrole + 10^{-3} M, 10^{-4} M, and 10^{-5} M L-histidine were respectively 108%, 142% and 144%. These findings are consistent with the hypothesis that amitrole is blocking one or more steps in the synthesis of L-histidine. From summary. D.M.L.S. [O.W.]

1601. HILL, K.L. (N.Carolina State Coll., Raleigh, U.S.A.). The effects of herbicidal chemicals on the activity of terminal oxidase enzymes in plant tissue. Ph.D.Thesis, N.Carolina State Coll., 1960, pp.153, Microfilm $2.75, Xerox $7.20.
The distribution of (a) cytochrome oxidase

(b) polyphenol oxidase and (c) ascorbic acid oxidase in root and foliage tissues of maize and soybeans was determined. All 3 enzymes were isolated from the root and foliage tissues of soybeans, while in maize (a) was present in roots and foliage, (b) only in foliage tissue and (c) only in root tissue.

The effect of various herbicides on the terminal oxidase activity in vitro was studied. None affected the activity of (c) at the concentrations used (generally 1 x 10^{-3} M); the activity of (b) was slightly reduced by diuron 1 x 10^{-3} M; the activity of (c) was inhibited by diuron, PCP, chlorpropham and propham in both maize and soybeans. Enzymes from both species responded in a similar manner to the herbicides.

Maize and soybeans, grown in nutrient cultures, were treated separately with 2,4,5-T, propham and diuron, to determine their effect in vivo on the terminal oxidase activity in root and foliage tissues. Two concentrations of each herbicide, which were sublethal to the plants but produced definite morphological responses, were used. Results obtained in these studies indicated that the responses of terminal oxidases in maize and soybeans to herbicide treatment were dependent on plant species, rate of herbicide application, location of the enzymes in the plant, and on the growth period of the plant. From Diss. Abstr. 22,(1),303. - J.W.F.

1602. FUNDERBURK, H.H. (Louisiana State Univ.,Baton Rouge,U.S.A.). A study of some physiological processes of corn as affected by N-(3.4-dichlorophenyl) methacrylamide. Ph.D.Thesis,Louisiana State Univ., 1961, pp.92, Microfilm $2.75, Xerox $4.80.

Dicryl caused a slight reduction in length of maize coleoptiles while IAA caused an increase in elongation, but Dicryl had no influence on elongation of coleoptiles which were also treated with IAA. Both roots and shoots were affected when Dicryl was applied to maize roots.

In studies in which 5- to 6-day-old maize seedlings were grown in soil containing 0 and 3 # Dicryl, it caused a sudden decrease in respiration of maize leaf tissue, and this steadily decreased during the test period. Low rates of 2,4-dinitrophenol stimulated respiration, while higher rates caused inhibition.

Dicryl had little effect on the activity of catalase 2 days after treatment, but 6 days later it caused 50% reduction in activity. Dicryl had essentially the same effect on peroxidase and glycolic acid oxidase activity. Three to 4 days after maize was treated with Dicryl there was a sudden increase in the oxidation of ascorbic acid, which continued to rise throughout the test period. From Diss.Abstr. 22,(1),40. - J.W.F.

1603. MINSHALL, W.H. (Pesticide Res.Inst., Univ.Sub-Post Office,London,Ontario,Canada). The effect of environment on the comparative resistance of petiole parenchyma to petroleum oils. Weeds, 1961, 9,(3),356-63, tabs.3, bibl.7.

By neutral red uptake and plasmolysis in calcium chloride the length of time required for 10% tetrahydronaphthalene (tetralin) in a paraffinic oil to kill 50% (LD 50) of the ground parenchyma cells from petioles of field-grown mustard (Brassica kaber var. pinnatifida), beet (Beta vulgaris), carrot (Daucus carota var. sativa), and parsnip (Pastinaca sativa) was 35, 40, 65 and 85 minutes respectively. Thus, the greater tolerance of the umbelliferous plants, carrot and parsnip, to petroleum oils was evident on a cellular level and appeared to arise through an increased resistance or protection of the cellular membranes.

Increased temperature increased the resistance of parenchyma cells of beet to 10% tetralin in paraffinic oil, but had little effect on the resistance of cells from parsnip. Likewise, when plants grown in a controlled environment room were compared with those grown in the field, the LD 50 of parsnip cells was markedly increased, while that of beet remained approximately the same. Because of the differential effect of environmental factors on the resistance of these species, the ratio of LD 50 values of parsnip to those of beet was 1, 1.5, 2 and 5 for plants grown in the glasshouse, cold frame, field and controlled environment room, respectively. As factors of the environment differed in the extent to which they changed the resistance of parenchyma cells of parsnips and of beet to petroleum oils, it is suggested that the total resistance of a plant cell may involve more than one component with contributions from different parts of the cell. Author's summary. [O.W.]

MISCELLANEOUS

1604. NETHERLANDS, PLANTENZIEKTENKUNDIGE DIENST. Bericht over onkruidbestrijdingsmiddelen. [Review of weed control chemicals.]

Ber.PlZiekt Kundige Dnst,Wageningen, 1961, 1422, pp.17.
Recommendations are given for weed control in grassland with MCPA, MCPB and 2,4-D, in lawns, in cereals with DNOC-ammonium, DNOC-acid, dinoseb-acetate, MCPB, mecoprop, MCPA + 2,3,6-TBA and fenoprop, in peas with dinoseb and dinoseb-acetate, in fibre-flax with DNOC, DNOC + MCPA, dinoseb and dinoseb + MCPA in seed beds with PCP in oil, chlorpropham, dimethyl xanthogen disulphide, dimethyl xanthogen disulphide + chlorpropham, endothal-sodium, N-trichloro hydroxyethyl monochloroacetamide + TCA and for weed control in onions and shallots, dimethyl xanthogen disulphide and diquat dibromide pre-em.; chlorpropham and potassium cyanate post-em.), in carrots (dimethyl xanthogen disulphide pre-em.; herbicidal oil post-em), in celeriac (propazine), in tulips, narcissus, hyacinths and gladicli, in tree nursery seed beds (allyl alcohol), in stubbles (TCA and dalapon for control of Agropyron repens) and for total vegetation control and for the control of brambles [Rubus spp.] and Urtica dioica with 2,4,5-T. The trade names of the different products used together with recommended dosage rates, are given. - P.J.B.

1605. CANADA, DEPARTMENT OF AGRICULTURE, NATIONAL WEED COMMITTEE, WESTERN SECTION. 1961 Weed control recommendations. Publ. Nat.Weed Cttee,Western Sect., [n.d.], pp.38.
Recommendations for a wide range of crops and weeds are brought up to date in this 1961 edition. - D.M.L.S. [W.21(71)]

1606. CANADA, MINISTRY OF AGRICULTURE, QUEBEC. Manuel d'emploi des herbicides. [Herbicide handbook.] Publ.Min.Agric., Quebec, 1961, 256, pp.80.
Recommendations are brought up to date in this 1961 edition. - D.M.L.S. [W.20(71)]

1607. EAST AFRICA, AGRICULTURAL AND FORESTRY RESEARCH ORGANIZATION. Conference on the control of couch and other grasses, particularly with the use of dalapon. Proc. Couch Control Conf.E.Afr.Agric.For.Res.Org., 1960, pp.53.
Papers are abstracted under the separate authors; for a summary see Weed Abstr. 10: 689. - D.M.L.S. [O.W.]

1608. AGRICULTURAL CHEMICALS. Pesticide situation. Agric.Chem., 1961, 16,(9),19-20, 142-3.
Gives data of the production and costs in the USA in 1958, 1959 and 1960 of a number of major pesticide chemicals, including calcium arsenate, 2,4-D acid, acid esters and acid salts (sodium and amine), lead arsenate, PCP, phenyl mercuric acetate, sodium chlorate, 2,4,5-T acid and 2,4,5-T acid ester and salts. - P.J.B.

1609. GREAT BRITAIN, BRITISH STANDARDS INSTITUTION. Recommended common names for pesticides. Publ.Brit.Standards Inst., 1961, pp.52.
This publication is British Standard 1831:1961 and is a revision embodying all the names previously published in B.S. 1831:1957, together with Supplements 1 and 2 and other names more recently adopted. It includes recommendations followed by this British Standard for coining common names, recommended common names for insecticides or acaricides, fungicides, rodenticides and herbicides, a list of pesticide chemicals not considered to need common names, and an extensive index. - P.J.B. [O.W.]

List of common names and abbreviations used for herbicides in Weed Abstracts

An asterisk (*) signifies approval by the British Standards Institution (BSI)
A plus sign (+) signifies approval by the Weed Society of America (WSA)
Where the name approved by the WSA differs from that approved by the BSI, the WSA name is given in brackets after the chemical name.

amiben +	3-amino-2,5-dichlorobenzoic acid
ametryne *	2-methylmercapto-4-ethylamino-6-isopropylamino-1,3,5-triazine
amitrole +	3-amino-1,2,4-triazole
AMS +	ammonium sulphamate
atrazine *+	2-chloro-4-isopropylamino-6-ethylamino-1,3,5-triazine
barban *+	4-chloro-2-butynyl-N-(3-chlorophenyl)carbamate
BiPC	butinol-N-(3-chlorophenyl)carbamate
CDAA +	2-chloro-NN-diallylacetamide
CDEA +	2-chloro-NN-diethylacetamide
CDEC +	2-chloroallyl-NN-diethyldithiocarbamate
chlorpropham *	isopropyl-N-(3-chlorophenyl)carbamate - (CIPC)
4-CPA *+	4-chlorophenoxyacetic acid
4-CPB	4-(4-chlorophenoxy)butyric acid
2,4-D *+	2,4-dichlorophenoxyacetic acid
dalapon *+	2,2-dichloropropionic acid
2,4-DB	4-(2,4-dichlorophenoxy)butyric acid - (4-(2,4-DB))
DCU +	dichloralurea
2,4-DEB +	2,4-dichlorophenoxyethyl benzoate
2,4-DEP +	tris-(2,4-dichlorophenoxyethyl)phosphite
2,4-DES *	2,4-dichlorophenoxyethyl hydrogen sulphate - (sesone)
di-allate *	2,3-dichloroallyl diisopropylthiolcarbamate
dichlone *+	2,3-dichloro-1,4-naphthoquinone
dichlorprop *	2-(2,4-dichlorophenoxy)propionic acid - (2-(2,4-DP))
dinosam *	2-s-amyl-4,6-dinitrophenol - (DNAP)
dinoseb *	2-s-butyl-4,6-dinitrophenol - (DNBP)
diquat *+	1,1'-ethylene-2,2'-bipyridylium-2A
diuron *+	N-(3,4-dichlorophenyl)-N'N'-dimethylurea
DMTT +	3,5-dimethyltetrahydro-1,3,5,2H-thiadiazine-2-thione
DNOC	2-methyl-4,6-dinitrophenol or 3,5-dinitro-o-cresol - (DNC)
endothal *+	3,6-endoxohexahydrophthalic acid
EPTC +	ethyl-NN-dipropylthiolcarbamate
erbon	2-(2,4,5-trichlorophenoxy)ethyl-2'2'-dichloropropionate
fenac +	2,3,6-trichlorophenylacetic acid
fenoprop *	2-(2,4,5-trichlorophenoxy)propionic acid - (silvex)
fenuron *+	N-phenyl-N'N'-dimethylurea
ipazine *+	2-chloro-4-diethylamino-6-isopropylamino-1,3,5-triazine
MCPA *+	4-chloro-2-methylphenoxyacetic acid
MCPB *	4-(4-chloro-2-methylphenoxy)butyric acid - (4-(MCPB))
mecoprop *	dl 2-(4-chloro-2-methylphenoxy)propionic acid - (2-(MCPP))
MH +	maleic hydrazide
monuron *+	N-(4-chlorophenyl)-N'N'-dimethylurea
neburon +	N-(3,4-dichlorophenyl)-N'-butyl-N'methylurea
naptalam *	N-1-naphthylphthalamic acid - (NPA)
OMU	N-cyclooctyl-N'N'-dimethylurea
paraquat *	1,1'-dimethyl-4,4'-bipyridylium-2A
PCP +	pentachlorophenol
prometon *	2-methoxy-4,6-bis(isopropylamino)-1,3,5-triazine
propazine *+	2-chloro-4,6-bis(isopropylamino)-1,3,5-triazine
propham *	isopropyl-N-phenylcarbamate - (IPC)
simeton *	2-methoxy-4,6-bis(ethylamino)-1,3,5-triazine
simazine *+	2-chloro-4,6-bis(ethylamino)-1,3,5-triazine
simetryne *	2-methylmercapto-4,6-bis(ethylamino)-1,3,5-triazine
SMDC +	sodium methyl dithiocarbamate
2,4,5-T *+	2,4,5-trichlorophenoxyacetic acid
2,4,5-TB	4-(2,4,5-trichlorophenoxy)butyric acid - (4-(2,4,5-TB))
2,3,6-TBA +	2,3,6-trichlorobenzoic acid
TCA +	trichloroacetic acid
2,4,5-TES +	sodium 2,4,5-trichlorophenoxyethyl sulphate
trietazine *+	2-chloro-4-diethylamino-6-ethylamino-1,3,5-triazine

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